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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

LEWIS, MONICA

ART UNIT

PAPER NUMBER

2822

DATE MAILED: 01/15/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/873,537

Applicant(s)

RADENS ET AL.

Examiner

Monica Lewis

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 04 June 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 22-30 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 22-30 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

**DETAILED ACTION**

1. This office action is in response to the application filed June 4, 2001.

***Claim Objections***

2. Claim 1 is objected to because of the following informalities: a) it appears that “as” should be “at” (See Claim 1 Line 13). Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 22-30 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is not clear what is meant by the following: a) “first level of electrically conductive features” (See Claim 1); b) “second level of electrically conductive features” (See Claim 1); and c) “first and second levels of electrically conductive features” (See Claim 26). Claims 23-25 and 27-30 depend directly or indirectly from a rejected claim and are, therefore, also rejected under 35 U.S.C. 112, second paragraph for the reasons set above.
5. Claim 22 recites the following limitation: a) “via spaces” (See Page 21 Line 18). There is insufficient antecedent basis for the limitations in the claim listed above.

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 22-27, 29 and 30, as far as understood, are rejected under 35 U.S.C. 103(a) as obvious over Chang (U.S. Patent No. 5,807,786) in view of Go et al. (U.S. Patent No. 5,592,016).

In regards to claim 22, Chang discloses the following:

a) a substrate having a first level of electrically conductive features (See Column 2 Lines 54-59);

b) a patterned anti-fuse dielectric layer (2) formed on said substrate, wherein said patterned anti-fuse dielectric layer includes an opening to at least one of said first level of electrically conductive features (See Figure 6);

c) a patterned interlevel dielectric material (6) wherein said patterned interlevel dielectric includes vias (3), at least one of said vias has a via space formed above said opening (See Figure 6); and

c) a second level of electrically conductive features (5b) formed in said vias and via spaces (See Figure 6).

In regards to claim 23, Chang discloses the following:

a) substrate is composed of an interlevel dielectric material that is the same or different from said patterned interlevel dielectric material (See Column 2 Lines 54-59).

In regards to claim 24, Chang discloses the following:

a) interlevel dielectric material is composed of an inorganic semiconductor material selected from the group consisting of SiO<sub>2</sub>, Si<sub>3</sub>N<sub>4</sub>, diamond, diamond-like carbon and fluorinated doped oxides (See Column 3 Lines 44-47).

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In regards to claim 25, Chang fails to disclose the following:

a) interlevel dielectric material is composed of an organic dielectric material selected from the group consisting of polyimides, polyamides, paralyene and polymethylmethacrylate.

However, Go et al. ("Go") discloses a semiconductor device where the dielectric material is composed of polyimides (See Column 4 Lines 39-48). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Chang to include a dielectric material composed of polyimides as disclosed in Go to resist abrasion.

In regards to claim 26, Chang discloses the following:

a) first and second levels of electrically conductive features are composed of the same or different conductive metal selected from the group consisting of aluminum, tungsten, copper, chromium, gold, platinum, palladium and alloys, mixtures and complexes thereof (See Column 4 Lines 59-64 and Column 3 Lines 36-38).

In regards to claim 27, Chang discloses the following:

a) anti-fuse dielectric layer is a dielectric material selected from the group consisting of  $\text{SiO}_2$ ,  $\text{Si}_3\text{N}_4$ , Si oxynitrides, amorphous Si, amorphous C, H-containing dielectrics, carbon, germanium, selenium, compound semiconductors, ceramics and anti-reflective coatings (See Column 3 Lines 9-10).

In regards to claim 29, Chang discloses the following:

a) interconnect level (10b) is formed over said patterned interlevel dielectric layer (See Figure 6).

In regards to claim 30, Chang discloses the following:

a) interconnect level includes a tapered metal contact region (See Figure 6).

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8. Claim 28, as far as understood, is rejected above under 35 U.S.C. 103(a) as obvious over Chang (U.S. Patent No. 5,807,786) in view of Go et al. (U.S. Patent No. 5,592,016) as applied to claims 22-27, 29 and 30 above, and further in view of McCollum et al. (U.S. Patent No. 5,770,885).

In regards to claim 28, Chang fails to disclose the following:

a) anti-reflective coating is silicon oxynitride.

However, McCollum et al. ("McCollum") discloses a semiconductor device where the anti-reflective coating is composed of silicon oxynitride (See Column 6 Lines 39-45). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Chang to include an anti-reflective coating of silicon oxynitride as disclosed in McCollum because it has a high dielectric constant which ultimately aids in reducing the leakage current while maintaining the same gate capacitance.

### ***Conclusion***

9. The following prior art made of record and not relied upon is considered pertinent to applicant's disclosure: a) Huggins (U.S. Patent No. 5,986,319) discloses a laser fuse and antifuse structure; b) Zheng et al. (U.S. Patent No. 5,705,849) discloses an antifuse structure and method for manufacturing; c) Chang (U.S. Patent No. 5,427,979) discloses a method for making a multi-level antifuse structure; and d) Cleaves (U.S. Patent No. 5,693,556) discloses a method of making an antifuse metal post structure.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Monica Lewis whose telephone number is 703-305-3743.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor,

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Carl Whitehead, Jr. can be reached on 703-308-4940. The fax phone number for the organization where this application or proceeding is assigned is 703-308-7722 for regular and after final communications. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

ML

January 14, 2002

  
**CARL WHITEHEAD, JR.**  
**SUPERVISORY PATENT EXAMINER**  
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